

An object has a density of 2.34 g/mL. It is submerged in a graduated cylinder and the water level rises from 13 mL to 37 mL. What is the mass of the object?

$$\textcircled{1} (D) = \left(\frac{m}{V} \right) \checkmark$$

$$D = 2.34 \text{ g/mL}$$

$$V = 37 \text{ mL} - 13 \text{ mL}$$

$$m = DV$$

$$= 24 \text{ mL}$$

$$m = ?$$

$$= (2.34 \text{ g/mL})(24 \text{ mL})$$

$$= 56.16 \text{ g}$$

$$\textcircled{2}$$

$$\textcircled{1}$$

Object has a density of 0.78 g/cm^3 and is a rectangular prism. If the mass is 5 g, the length is 3 cm, width is 7 cm, what is the height of the object?

$$D = \frac{m}{V}$$

$$h(D) = \left(\frac{m}{lwh} \right) h$$

$$\frac{hD}{\cancel{D}} = \left(\frac{m}{lw} \right) \frac{1}{\cancel{D}}$$

$$h = \frac{m}{lwD}$$

$$= \frac{5 \text{ g}}{(7 \text{ cm})(3 \text{ cm})(0.78 \text{ g/cm}^3)}$$

$$= 0.31 \text{ cm}$$

$$D = 0.78 \text{ g/cm}^3$$

$$m = 5 \text{ g}$$

$$l = 3 \text{ cm}$$

$$w = 7 \text{ cm}$$

$$h = ?$$

$$V = lwh$$

What is Matter?

- Anything that has mass and takes up space.
- Two categories:
 - Substances
 - Mixtures



- Substances
 - Elements →
 - Compounds

1	Hydrogen	1
	H	
	1.008	

- Elements
 - Pure substances that are made of only 1 type of atom
 - 118 known elements
 - 92 occur naturally
 - Only an element if it appears in the periodic table

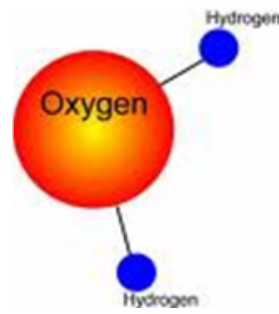
Periodic Table of the Elements															
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
H	He														
Li	Be	B	C	N	O	F	Ne								
Na	Mg	Al	Si	P	S	Cl	Ar								
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te
Cs	Ba	*La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po
Fr	Ra	*Ac	Rf	Ha	106	107	108	109	110						

* Lanthanide Series	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
* Actinide Series	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr

- We write elements with the first letter capitalized and the second letter (if applicable) as lowercase
- Atoms → the smallest unit of an element that is still the element
- All atoms of the element have the same basic structure

- Compounds

- Two or more elements bonded together in a fixed proportion



- Example : $\text{H}_2\text{O} \rightarrow$ water

always 2 H's for one O

- If you see two elements written together with no spaces, it is a compound

- Physical processes CANNOT separate compounds

- Compounds have different characteristics than the elements that combine to form them



Sodium
(Na)



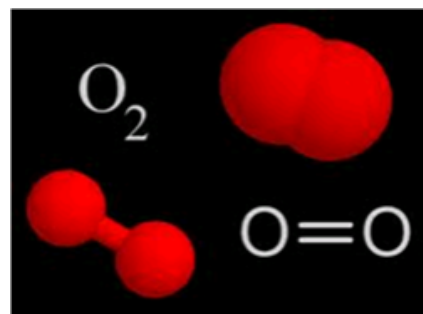
Chlorine
(Cl)



- Molecule

- Two or more of the same element

- bonded together in a fixed proportion



- The smallest form of a compound that can exist and still have the same properties as the compound

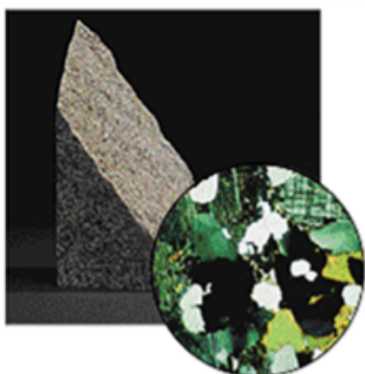
- Mixtures
 - Contain more than one type of matter that is NOT chemically bonded together
 - Can separated physically
 - Two types:
 - Homogeneous
 - Heterogeneous



All pictures are examples of heterogeneous mixtures.

- Heterogeneous mixtures:
 - Matter is not made up of the same proportions
- Homogeneous mixture:
 - Matter is the same throughout; evenly blended
 - Also called a solution





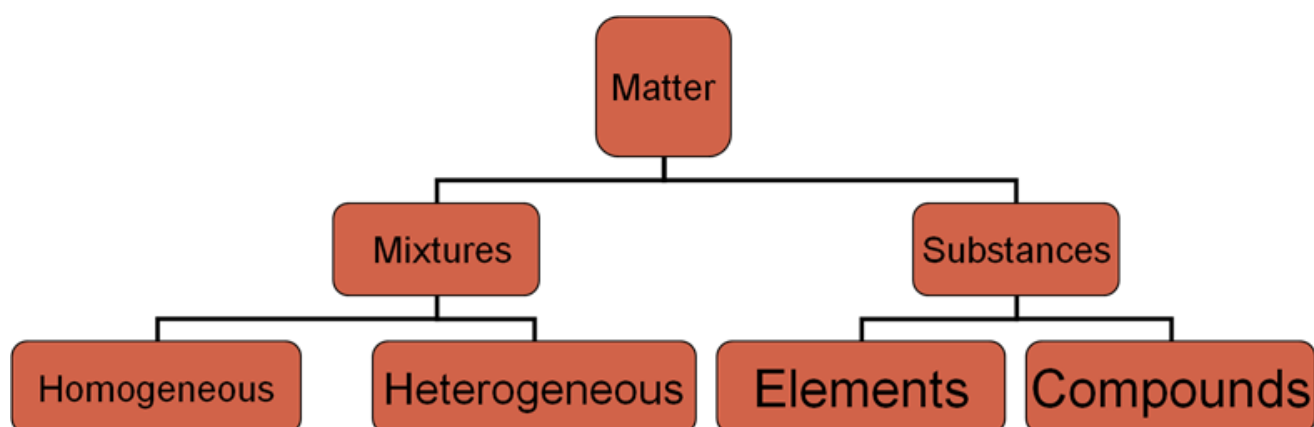
A Granite, a heterogeneous mixture



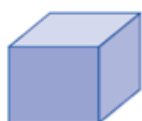
B Human blood, a heterogeneous mixture



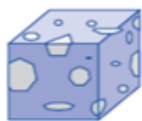
C Copper(II) sulfate (CuSO_4) in water, a homogeneous mixture (solution)



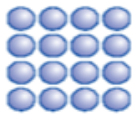
Types of Matter



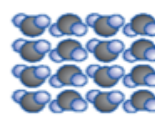
Homogeneous mixture



Heterogeneous mixture



Element



Compound

Type of matter	Definition	Examples
Homogeneous mixture	A mixture that contains more than one type of matter and is the same throughout.	soda pop, air, chocolate ice cream
Heterogeneous mixture	A mixture that contains more than one type of matter and is not the same throughout.	chicken soup, soil, fudge ripple ice cream
Element	A substance that contains only one type of atom.	copper metal, oxygen gas, liquid nitrogen
Compound	A substance that contains more than one type of atom.	table salt, rust (iron oxide), carbon dioxide gas